

SPECIES OF *LUPINUS* (FABACEAE) OCCURRING IN NORTHEASTERN MEXICO (NUEVO LEON AND CLOSELY ADJACENT STATES)

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ABSTRACT

A revisionary study of *Lupinus* for northeastern México (Coahuila, Nuevo León, and Tamaulipas) is rendered. Ten species are recognized: *L. bartlettianus* C.P. Smith; *L. caballoanus* B.L. Turner, *sp. nov.*; *L. havardii* S. Wats.; *L. hintonianorum* B.L. Turner, *sp. nov.*; *L. muelleri* Standl.; *L. platamodes* C.P. Smith; *L. partisans* Rose; *L. stipulatus* Agardh; and *L. texensis* Hook. A key to these taxa, relevant synonymy, and distributional maps are provided. Chromosome counts of  $n = 18$  pairs were obtained from several populations from México previously referred to *L. leonensis*, the latter herein treated as part of *L. texensis*; counts of  $2n = ca. 24$  pairs are reported for *L. caballoanus*.

KEY WORDS: Fabaceae, *Lupinus*, México, chromosomes

*Lupinus*, with 1000 or more described species, is a taxonomically difficult genus. This is especially true for México where numerous names from isolated regions have been proposed. Dunn (1981) has provided a useful account of those taxa occurring in the immediate environs of México City and McVaugh (1987) has provided a treatment of the genus for his *Flora Nova-Galiciana*. Dunn & Harmon (1977) produced a very useful study of the Mexican species centering about *Lupinus montanus* H.B.K., while C.P. Smith (1938-1953), in many issues of his notorious Species Lupinorum, provided miscellaneous floristic accounts for the lupines of central and northwestern México.

Floristic treatments of the lupines occurring in northeastern México are largely wanting, and the taxa described for this region by C.P. Smith are held to be highly suspect, especially since six of these were described from a single, relatively restricted mountainous area of Tamaulipas (*cf.* synonymy under *Lupinus bartlettianus* C.P. Smith, below).

My attempts to identify the numerous collections of *Lupinus* assembled in recent years by the Hinton family have provided the impetus for the present

study. I have tried to be conservative in my judgments as to what constitutes a species in this group, but by the morphological criteria established for species recognition in *Lupinus* by earlier workers, it is difficult to assess specific lines. In short, the observations and hypotheses speculated upon here need to be shorn up by additional observations, especially field study.

KEY TO LUPINES OF NORTHEASTERN MEXICO  
(Coahuila, Nuevo León, and Tamaulipas)

1. Winter annuals or biennials. ....(2)
1. Perennials. ....(3)
  2. Inflorescence at full anthesis mostly 5-20(-25) cm long; leaflets glabrous above, or nearly so, pubescent below. .... *L. texensis*
  2. Inflorescence at full anthesis mostly 30-40 cm long; leaflets pubescent on both surfaces. .... *L. havardii*
3. Midstem leaves with stipules united at their base for 2/3 their length or more, the free portions mostly shorter than the united portion. ....  
..... *L. cacuminis*
3. Midstem leaves with stipules united at their base for 1/3 their length or less, the free portions mostly longer than the united portion. ....(4)
  4. Stem hairs more or less viscid-pilose, spreading at right angles to the stem; vicinity of Cabo de Caballos; Nuevo León and closely adjacent Tamaulipas. .... *L. caballoanus*
  4. Stem hairs variously appressed to ascending, but not as described in the above. ....(5)
5. Banner clearly pubescent on the adaxial (back) surface near the apex; midstem leaves with leaflets mostly 6-8 cm long. .... *L. hintoniorum*
5. Banner mostly glabrous throughout, or if sparsely pubescent with a few hairs on the dorsal surface, then the midstem leaves with leaflets mostly 3-5 cm long. ....(6)
  6. Banner 5-7 mm high, clearly much shorter than the wing and keel petals are long. .... *L. stipulatus*
  6. Banner 10-20 mm high, as high as the wing and keel petals are long.  
.....(7)

7. Petioles pubescent with brown or dark tawny hairs, some or many of the latter 1.5 mm long or more; Sierra de San Carlos, Tamaulipas. . . . . *L. bartlettianus*
7. Petioles pubescent with white or silvery hairs, the latter mostly 0.8 mm long or less. . . . . (8)
8. Midstem leaves with leaflets broadly oblanceolate, mostly 15 mm wide. . . . . *L. platamodes*
8. Midstem leaves with leaflets linear-oblanceolate, mostly 3-8 mm wide. . . . . (9)
9. Banner glabrous throughout; leaves mostly 6-10 cm long; mostly fall-flowering. . . . . *L. potosinus*
9. Banner pubescent dorsally with 1 or a few hairs; midstem leaves mostly 3-6 cm long; mostly spring-flowering. . . . . *L. muelleri*

1. *Lupinus bartlettianus* C.P. Smith, *Sp. Lup.* 253. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, La Vegonia, vicinity of San José, 3000 ft., 2 Jul 1930, *H.H. Bartlett 10023 "f"* (HOLOTYPE: CAS!).

*Lupinus partisans* Rose var. *bartlettii* C.P. Smith, *Sp. Lup.* 45. 1938. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, La Vegonia, vicinity of San José, 3000 ft., 2 Jul 1930, *H.H. Bartlett 10023 "e"* (LECTOTYPE [selected here]: CAS!).

When originally described, Smith designated collection number 10023 (w/o subscripts) as the type. Later, in his description of *L. bartlettianus* and cohorts, he provided lettered subscripts to all of Bartlett's collections from the Sierra de San Carlos. While he listed the lectotype selected here as belonging to his concept of *L. bartlettianus*, he cited its type as 10023 "f", which confuses the typification process, since we have two different names proposed by the same author with the same type. Since in his original description of *L. p.* var. *bartlettii* Smith did not provide lettered subscripts, I have selected from among the two subsequently subscripted numbers 10023 "e" to lectotypify his *L. p.* var. *bartlettii*. This would seem prudent since Smith in his prologue gave the name "*Lupinus bartlettianus* sp. nov." as the correct name for the taxon, although he subsumed his earlier var. *bartlettii* under it. Apparently he

did not intend to provide a new combination in this instance (which might be inferred). Regardless, treated at the rank of species, the correct name would be *L. bartlettianus*, as treated here. It will be noted that under *L. omalophyllus* C.P. Smith (discussed below), each of the remaining collections of *Bartlett 10023* to which subscripts were added by Smith (*10023 a, b, c, d*) were positioned in his concept of *L. omalophyllus* (typified by *10023 c*).

*Lupinus harleyanus* C.P. Smith, *Sp. Lup.* 355. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, Cerro Barril, vicinity of San José, 19 Jul 1930, *H.H. Bartlett 10479 "e"* (HOLOTYPE: CAS!).

*Lupinus oligostolus* C.P. Smith, *Sp. Lup.* 253. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, Cerro Zamora, vicinity of El Milagro, 22 Aug 1930, *H.H. Bartlett 11096 "a"* (HOLOTYPE: CAS!).

*Lupinus omalophyllus* C.P. Smith, *Sp. Lup.* 252. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, La Vegonia, vicinity of San José, 3000 ft, 2 Jul 1930, *H.H. Bartlett 10023 "c"* (HOLOTYPE: CAS!; Isotypes: *Bartlett 10023 "a", "b", "d"* [CAS!]).

Smith provided lettered subscripts to each of Bartlett's collections; I consider these to be isotypes, each being annotated by Smith as *Lupinus omalophyllus*. Technically, some purists would consider the latter collections to be paratypes, if not syntypes.

*Lupinus stolidotus* C.P. Smith, *Sp. Lup.* 253. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, Cerro Barril, vicinity of San José, 19 Jul 1930, *H.H. Bartlett 10479 "a"* (HOLOTYPE: not located; Isolectotype: *Bartlett 10479 "b"* [CAS!]). Holotype material was not located at CAS, where Smith's original material should be on deposit; I consider *Bartlett's 10479 "b"* to be an isotype, Smith having annotated it as "*L. stolidotus* sp. nov." in spite of the subscript "*b*" which he added to the number.

*Lupinus tamaulipensis* C.P. Smith, *Sp. Lup.* 153. 1941. TYPE: MEXICO. Tamaulipas: Sierra de San Carlos, Cerro Ramora, vicinity of El Milagro, 22 Aug 1930, *H.H. Bartlett 11046 "b"* (HOLOTYPE: CAS!).

Perennial herbs 30-50 cm high. Midstems densely tawny-pilose. Midstem leaves mostly 6-10 cm long; stipules 8-12 mm long, the united portion 2-4 mm

long; petioles mostly 4-6 cm long, pubescent like the stem, the longer hairs 1.5-1.8 mm long; leaflets mostly 5-7, elliptic-obovate to obovate, 3-5 cm long, 0.6-1.0 cm wide, sparsely appressed-pilose in both surfaces. Inflorescence 10-30 cm long, the flowers with pedicels 1-2 mm long. Corollas blue; standards 8-9 mm high, glabrous; wing and keel petals 8-11 mm long, the keel decidedly ciliate along the upper margins. Pods 3-4 cm long, ca. 7 mm wide, pubescent like the stems, mostly bearing 4-8 seeds; seeds blackish-white mottled, quadrangular, 3-4 mm long, 2.5-3.0 mm wide.

This taxon is clearly closely related to *Lupinus partisans* Rose having most of the characters of that species, but is readily separable from it by its tawny or rusty, long-pilose, vestiture (the longer hairs 1.5 mm long or more vs. whitish and 0.5 mm long or less).

2. *Lupinus caballoanus* B.L. Turner, *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Santiago, vicinity of Cola de Caballo, pine-oak woodlands, "vegetación cercana a corrientes de agua. Roca sedimentaria y arenisca", 800 m, 30 Apr 1987, J.A. Villarreal & M.A. Carranza 3669 (HOLOTYPE: TEX!).

*Lupino platamodi* C.P. Smith similis sed racemis partibus foliaceis caulibus longioribus et vestimento trichomatus viscidipilosorum patentium (vs. non viscidorum antrorse appressorum) differt.

Perennial herbs 35-100 cm high. Stems erect, simple, or much-branched from the base when the primary stem is damaged or removed, densely viscid-pilose, the hairs mostly 0.5-1.0 mm long and spreading at right angles to the stem. Midstem leaves mostly 8-10 cm long; stipules linear-lanceolate, fused below for ca. 1 mm, the free portions 6-10 mm long; petioles 5-7 cm long, pubescent like the stems; leaflets 5-7, oblanceolate, 2-4 cm long, 0.8-1.2 cm wide, appressed-pilose on both surfaces. Inflorescence 20-40 cm long, longer than the leafy part of the stems, the pedicels mostly 3.5-4.5 mm long, pilose like the stems. Corollas blue; banner 9-12 mm long, glabrous; wing and keel petals 10-15 mm long, the keel ciliate along the upper margins. Pods ca. 3 cm long, 0.7 cm wide, 3-5 seeded, pilose with ascending hairs 1-2 mm long; seeds brown-mottled, ca. 3.5 mm long, ca. 3.0 mm wide. Chromosome number, from 3 populations,  $n = \text{ca. } 24$  pairs (*Ferguson 9, 10, 11*; TEX).

ADDITIONAL COLLECTIONS EXAMINED: MEXICO. Nuevo León: Mpio. Santiago, Cola de Caballo, oak-pine woodland, 22 Mar 1992, *Neff 7* (TEX); vicinity of Cola de Caballo, 14-15 Mar, 1994, *Ferguson 9, 10, 11* (TEX). Tamaulipas: Mpio. Hidalgo, Ej. Conrado Castillo, pine woodland, 6 Nov 1989, *Aguilar 1* (TEX).

This taxon is characterized by its elongate flexuous racemes which are equal to or longer than the leafy portions of the stem. Especially noteworthy is its

often pilose-viscid spreading vestiture which, to my knowledge, is unknown among the Mexican lupines generally.

*Lupinus caballoanus* is a spring-bloomer; the specimen cited from Tamaulipas (collected in November) is in a late-fruited stage (with a flowering sprig on the same sheet!).

3. *Lupinus cacuminis* Standl., Field Mus. Nat. Hist., Bot. Ser. 22:79. 1940. TYPE: MEXICO. Nuevo León: Mpio. Galeana, summit of Cerro Potosí, Mueller 2264 (HOLOTYPE: F; Isotype: TEX!).

Dunn & Harmon (1977) have rendered an excellent description of this species, pointing out its relationship to both *Lupinus montanus* and *L. muelleri* Standl. *Lupinus cacuminis* is largely confined to alpine or subalpine habitats (3000-3400 m) and is found on the higher isolated peaks southeast of Saltillo, and on Cerro Potosí (Figure 1). It is represented by numerous sheets at LL, TEX and is a fall-bloomer.

4. *Lupinus havardii* S. Wats., Proc. Amer. Acad. Arts 17:369. 1882. TYPE: U.S.A. Texas: Presidio Co., hills near Presidio, May 1881, V. Harvard s.n. (HOLOTYPE: GH!).

This biennial species resembles *Lupinus texensis* but is readily distinguished from the latter by its more robust habit, more elongate racemes, and larger leaflets which are pubescent on both surfaces. *Lupinus havardii* was first described from the Big Bend region of trans-Pecos, Texas, and is largely confined to that area and closely adjacent México. Chromosome counts are not available for *L. havardii*, but these are likely to be  $2n = 18$  pairs since the taxon seems closely related to *L. texensis*.

5. *Lupinus hintoniorum* B.L. Turner, sp. nov. TYPE: MEXICO. Nuevo León: Mpio. Zaragoza, Cerro El Viejo, 2590 m, "Llano" forming "dense colonies," 2590 m, 17 Jun 1993, G.B. Hinton et al. 22936 (HOLOTYPE: TEX!; Isotypes: CAS!, MEXU, NY!).

*Lupino potosino* Standley similis sed plants robustioribus racemis majoribus floribus majoribus ferentibus et vexilli pagina dorsali manifeste pubescentis (vs. glabri) differt.

Stiffly erect suffruticose herbs 0.6-1.5 m high. Midstems 4-5 mm across, finely appressed-strigose. Midstem leaves mostly 9-15 cm long; stipules united for 4-10 mm at the base, the free portions linear-lanceolate, 8-20 mm long;

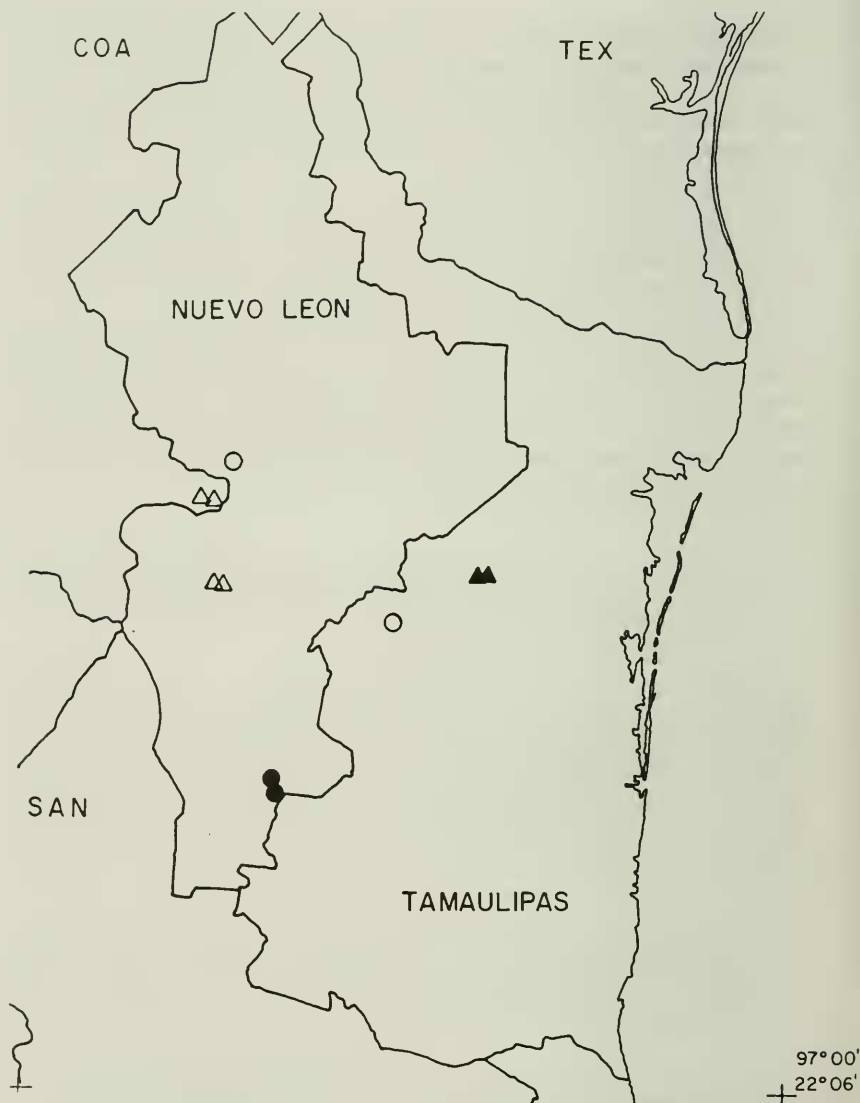


Figure 1. Distribution of *Lupinus* species: *L. bartlettianus* (closed triangles), *L. caballoanus* (open circles), *L. cacuminis* (open triangles), and *L. hintoniorum* (closed circles).

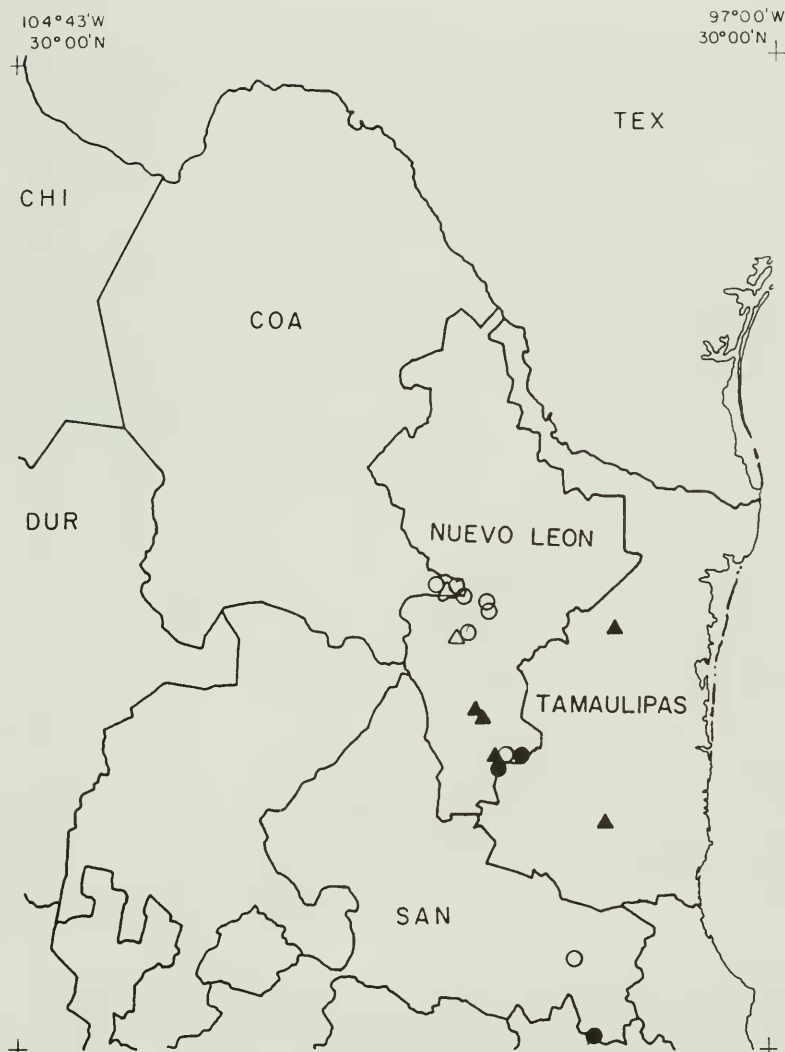


Figure 2. Distribution of *Lupinus* species: *L. muelleri* (open triangles), *L. platamodes* (closed triangles), *L. partisans* (open circles), and *L. stipulatus* (closed circles).



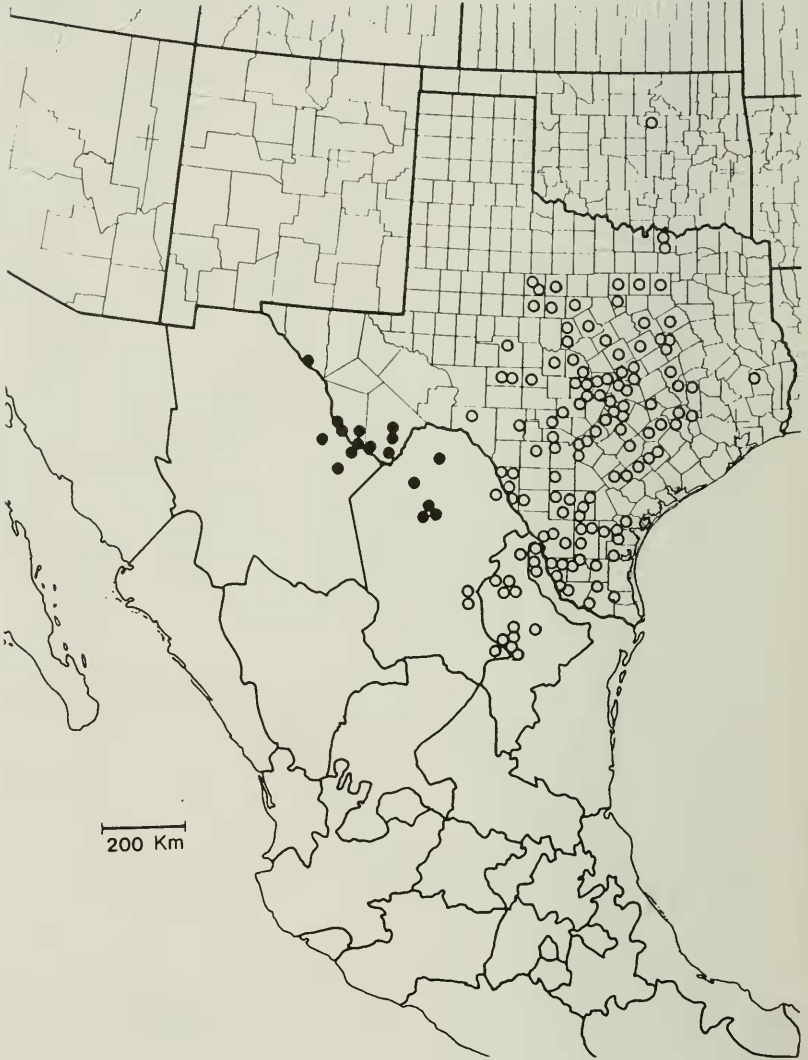


Figure 3. Distribution of *Lupinus havardii* (closed circles) and *L. texensis* Hook. (open circles).

leaflets mostly 7-9, linear-elliptical to linear-oblongate, 5-8 cm long, 1.0-1.5 cm wide, moderately and finely appressed-strigose on both surfaces, widest at or near the middle. Inflorescence mostly 20-35 cm long with numerous flowers, the pedicels mostly 8-10 mm long. Corollas described as blue, purple, white and purple, or "snow white"; banner 10-14 mm long, pubescent dorsally near the apex; wing and keel petals 12-15 mm long, the keel ciliate along the upper margins. Pod 4-5 cm long, 4-6 seeded, ca. 0.8 cm wide, sparsely and finely appressed-strigose with short hairs; seeds (immature), seemingly not mottled, ca. 5 mm long, 4 mm wide.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Nuevo León: Mpio. Aramberri, Cerro El Viejo, 2040 m, 20 Feb 1993, *Hinton et al.* 22657 (NY, TEX); Cerro El Viejo, 25 May 1993, 2580 m, *Hinton et al.* 22840 (CAS, TEX); Mpio. Zaragoza, La Encantada, 2540 m, 8 Feb 1989, *Hinton et al.* 19329 (TEX); Cerro Viejo, 2440 m, 22 Sep 1993, *Hinton et al.* 23456 (TEX); Cerro El Viejo, 2660 m, 23 Jun 1993, *Hinton et al.* 22967 (NY, TEX); Cerro El Viejo, 2650 m, 23 Jun 1993, *Hinton et al.* 22972 (NY, TEX); trail from Cañada La Tinaja to Rancho La Encantada, 2600-2700 m, 4 Jul 1988, *Patterson* 5863 (MEXU, TEX).

This species is represented by a large suite of lovely collections from Cerro Viejo and vicinity assembled by the Hinton family, mostly during spring or early summer, their principal flowering periods. Because of their beautiful assemblage I have named this taxon for the Hinton family, fully aware that there already exists a *Lupinus hintonii* C.P. Smith, from the southwestern portions of México named for the late G.B. Hinton, patriarch of this exceptional botanical lineage.

*Lupinus hintoniorum* superficially resembles *L. partisans* Rose, a widespread species readily distinguished from the former by its smaller habit, smaller leaflets, shorter inflorescences and glabrous banners. While described as robust and erect, it should be noted that one of the Hinton labels (23456, cited above) gives the habit as "decumbent" (apparently the stems had been stepped upon, appressing these to the ground).

6. *Lupinus muelleri* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 22:80. 1940. TYPE: MEXICO. Nuevo León: Cerro Potosí, Las Canoas, 17 Jul 1935, *C.H. Mueller* 2205 (HOLOTYPE: F; Isotype: TEX!).

This taxon is treated and neatly described by Dunn & Harmon (1977). It is closely related to *Lupinus partisans* but appears to occur at generally higher elevations (2700-3200 m) in pine forests and seems readily distinguishable from that species by its smaller leaves and pubescent banner.

7. *Lupinus platamodes* C.P. Smith, *Sp. Lup.* 254. 1941. TYPE: MEXICO Tamaulipas: Sierra de San Carlos, near crest of range above Mesa de Tierra, near San José, 12 Jul 1930, *H.H. Bartlett 10268* (HOLOTYPE: CAS!).

Perennial herbs 20-50 cm high. Midstems ascending pilose to strigose, the hairs white or silvery. Midstem leaves mostly 5-11 cm long; stipules separate to the base or nearly so, 5-11 mm long; petioles mostly 4-7 cm long; leaflets 5-7, oblanceolate, mostly 3.5-6.0 cm long, 1.0-1.5 cm wide, sparsely appressed-pubescent on both surfaces. Inflorescence 10-12 cm long, the flowers on pedicels 2-4 mm long. Corollas purple to blue; standards 9-12 mm high, glabrous or a few hairs present dorsally; wings and keel petals mostly 10-13 mm long, the keel ciliate along the upper margins. Pods 3-4 cm long, 0.7-0.8 cm wide, moderately appressed-pilose, mostly bearing 4-7 seeds; seeds grayish-white mottled, quadrangular, 3-4 mm long, 2.5-3.5 mm wide.

This taxon is closely related to *Lupinus caballoanus* but is readily distinguished by its ascending nonviscid pubescence (vs. spreading-viscidulous) and generally smaller flowers on shorter racemes (10-12 cm long vs. 15-30 cm).

In addition to the type, following specimens have been examined. MEXICO. Nuevo León: Mpio. Aramberri, Cerro El Viejo, 1695 m, 28 Jul 1993, *Hinton et al. 29201* (TEX); La Escondida to Josecito, 1670 m, 13 Nov 1993, *Hinton et al. 29925* (TEX).

8. *Lupinus partisans* Rose, *Contr. U.S. Natl. Herb.* 8:309. 1905. TYPE: MEXICO. San Luis Potosí: Alvarez, 28 Sep-3 Oct 1902, *E. Palmer 191* (HOLOTYPE: US).

This taxon is closely related to *Lupinus hintoniorum* (from within our region) and *L. elegans* H.B.K. (from regions to the south). *Lupinus partisans* is relatively widespread and variable, according to annotations of the late D.B. Dunn, and citations by C.P. Smith, occurring from the states of Durango to Morelos along the western portions of México, and in eastern México from Coahuila to Puebla. Occasional plants from the more northern parts of its range may have a few hairs on their banners (e.g., *Hinton 28850* [TEX], from Arteaga, Coahuila); perhaps such hairs are the result of occasional hybridization of *L. partisans* with *L. muelleri* in this region, the latter possessing hairs on its banner.

9. *Lupinus stipulatus* Agardh, *Syn. Gen. Lupin.* 23. 1835.

This taxon is readily recognized from among species in northeastern México by its relatively small flowers, the banner poorly developed and shorter than

the wing and keel petals. The species is known to me in the region concerned by only two collections from Nuevo León, as follows (one of these annotated by D.B. Dunn as *Lupinus stipulatus* var. *exilis* C.P. Smith): Mpio. Zaragoza, below La Encantada, ca. 2700 m, 26 Jun 1978, *Hinton et al. 17420* (TEX); Mpio. Zaragoza, Cerro El Viejo, edge of cornfield, 2365 m, 4 Aug 1993, *Hinton et al. 23318* (TEX).

10. *Lupinus texensis* Hook., Bot. Mag. 63, t. 3492. 1836.

*Lupinus leonensis* S. Wats., Proc. Amer. Acad. Arts 7:338. 1882. TYPE: MEXICO. Nuevo León: "At Guajuco", which is Villa Santiago today, a village ca. 27 mi SE of Monterrey, 8 Mar 1880, *E. Palmer 198* (HOLOTYPE: GH!).

As indicated in Figure 3, *Lupinus texensis* extends into México as far south as Monterrey, Nuevo León. I can find no compelling characters which might distinguish *L. leonensis* from *L. texensis*, the former reputedly occurring from central Nuevo León and adjacent Coahuila northwards to the Texas border. Furthermore, *L. texensis* is one of only two species of *Lupinus* in North America with chromosome counts of  $n = 18$  pairs (Turner 1957). To determine if Mexican material referable to *L. leonensis* might not also be  $n = 18$ , the following collections were examined for their meiotic chromosome numbers; all proved to be diploid with  $n = 18$  pairs. [Nuevo León: Mpio. Santiago, Santiago, SE of Monterrey in canyon La Boca of Sierra La Silla, 14 Mar 1994, *Ferguson 8* (TEX); Mpio. Higuera, Cuesta Mamulique, 17 Mar 1994, *Ferguson 16* (TEX); Mpio. Higuera, Cuesta Mamulique, 17 Mar 1994, *Ferguson 18* (TEX); Mpio. Bustamante, below Grutas de Bustamante, 18 Mar 1994, *Ferguson 24* (TEX).]

The above vouchers for chromosome counts (indeed, most of the collections from northeastern México which I assign to *Lupinus texensis*) differ somewhat from "typical" *L. texensis* as it occurs in central Texas in having a stiffly erect, less bushy habit, generally longer racemes (mostly 10-25 cm long vs. 5-15 cm long) with more gradually tapering apices (vs. abruptly tapered apices), and mostly larger flowers (wing petals 10-14 vs. 8-12 mm long). In Texas, *Lupinus texensis* typical occurs in deep calcareous or silty-clay soils, while in northern México, the species occurs in shallow calcareous soils, both along roadsides and in native brushland (mesa tops, etc.). Since the characters which might distinguish these are variable, both within and between populations over a fairly large area in southern Texas and northern México, and especially since the chromosome number of all such populations are  $n = 18$  pairs, I have opted to not treat the Mexican population as varietally distinct, as might be suggested by the distribution of characters listed above. The only other species in the U.S.A., so far as known, with chromosome counts of  $n = 18$  pairs is *L. subcarnosus* Hook., but the latter is clearly specifically distinct since it does

not intergrade or hybridize with the *L. tezensis*, even when occurring with it (Turner 1957). This seems not to be so with the proposed *L. leonensis*, which would appear to fall readily under the fabric of an enlarged *L. tezensis*, although future workers may opt to treat these as varietal categories, there being intergradations of the characters concerned in the border regions of Texas/México.

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